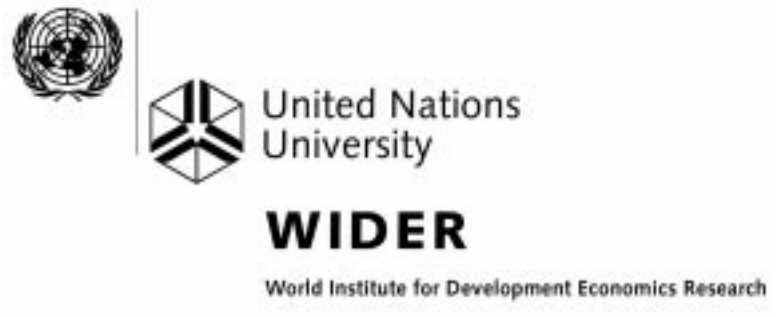

Discussion Paper No. 2001/132

Are Inequality and Trade Liberalization Influences on Growth and Poverty?

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November 2001

Abstract

There has been a recent resurgence of interest in the relationship between income inequality and growth, manifested in a number of important publications. In parallel with this, concern with the impact of economic reform and globalization on developing countries has led to an upsurge of interest in linkages between policy reform, growth, inequality and poverty. We use the WIDER/UNDP World Income Inequality Database to investigate the links between growth, inequality and trade liberalization for a sample of developing countries, and the more limited World Bank Global Poverty Monitoring Database for an exploratory analysis of the influence of these variables on levels of poverty. The cross-section results suggest that in the long-run, higher inequality is associated with lower growth. There is weak evidence that openness is associated with higher growth. A panel analysis suggests that inequality is unrelated to growth in the short-run, although trade liberalization appears to have a positive impact on growth. Regarding poverty, the only consistent patterns are that higher levels of human capital are associated with lower levels of poverty, while poverty is higher in sub-Saharan Africa. There is no evidence that growth and trade liberalization affect poverty, although countries that have sustained an open trade regime appear to have lower levels of poverty.

Keywords: trade, inequality, growth, poverty, developing countries

JEL classification: F14, F43, O15, O40

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This study is linked to the theme of Growth and Poverty discussed at the WIDER Development Conference, 25-26 May 2001, Helsinki. UNU/WIDER gratefully acknowledges the financial support from the governments of Denmark, Finland and Norway to the 2000-2001 research programme.

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Camera-ready typescript prepared by Lorraine Telfer-Taivainen at UNU/WIDER
Printed at UNU/WIDER, Helsinki

ISSN 1609-5774
ISBN 92-9190-086-9 (printed publication)
ISBN 92-9190-087-7 (internet publication)

1. Introduction

There has been a resurgence of interest in the nature of the relationship between inequality and growth in recent years. This interest can be attributed to a number of factors. First, the observation that the high-performing East Asian economies exhibited relatively low levels of inequality whereas many poor-performing economies, especially in Latin America, had relatively high inequality prompted researchers to consider if inequality was growth retarding. Second, there has been a dramatic increase in empirical research on economic growth, and a number of studies include indicators of inequality as a potential determinant of growth. Furthermore, and more relevant to this study, research on the determinants of growth in developing countries has become concerned with possible linkages between policy reform, growth, inequality and poverty.

Our primary interest in this paper is to assess if there is any significant relationship (empirical regularity) between inequality, trade policy reform, growth and poverty. While poverty has become the major development concern in recent years, notably in donor aid policy, the paucity of time series data on poverty across countries renders it a difficult issue to investigate empirically. Using a combination of the World Bank Global Poverty Monitoring database (World Bank, 2001) and data from Hanmer and Naschold (2001), we have, over the period 1985-95, two observations of the level of poverty for over 30 countries. With so little data, our empirical analysis of effects on poverty is preliminary. We do not test any hypotheses of the determinants of poverty derived from theory, but rather look for empirical patterns in the data.

Some researchers have circumvented the lack of direct measures by deriving indirect measures of poverty from data on inequality (Dollar and Kraay, 2001). One difficulty with this approach is that there is no systematic relationship between inequality and poverty, even if they tend to be positively correlated over time. Furthermore, there is no systematic relationship between economic growth and inequality (e.g. Ravallion, 1997). In fact, across countries and over time inequality, on average, tends to change very little and researchers have not identified any consistent determinants of changes in inequality (there are few empirical regularities in the data). This is the principal reason why we do not try to derive poverty measures from inequality data.

The approach adopted in this paper is to first assess if inequality and trade policy appear to be determinants of growth. We make use of the data that has recently been made available in the World Income Inequality Database (WIID, compiled by UNDP and WIDER) to construct a panel of developing countries, including countries from sub-Saharan Africa (SSA), for the empirical analysis. Then, we consider if growth, inequality and trade policy indicators help to explain variations in levels of poverty for the countries in our sample.

Income inequality may have a direct effect in retarding growth. That is, an unequal distribution of income may mean that the majority of the population does not share in the benefits of growth, hence the incentives to them to contribute to growth are muted (e.g. weaker incentives to work harder or be entrepreneurial). This is consistent with some of the evidence for East Asia—that ‘shared growth’ encourages dynamism and effort (Morrissey and Nelson, 1998). In this context, inequality captures the fact that a section of society is disadvantaged, and one might expect a direct positive correlation between inequality and

poverty. An alternative view is that income inequality is representative of other distortions in the economy, and can be used as a proxy measure for these growth-retarding features of the economy. In an economy where power is concentrated, distortions are widespread and rent-seeking is prevalent, we may expect to observe relatively high levels of inequality (and relatively poor growth performance). In this interpretation, inequality may not be directly related to poverty (i.e. inequality is not a causal influence on levels of poverty), but there will be an indirect effect via slow growth (i.e. the rate of poverty reduction will be slow in countries with high inequality).

Whilst inequality may proxy for policy distortions, such distortions (or some of them) may be removed without there being an immediate effect on inequality. For this reason, we include indicators of trade policy in addition to inequality. Trade liberalization (reduction or removal of trade-related distortions) should promote growth as it increases the efficiency of the economy, but the effect on inequality is ambiguous. Workers may shift from declining (import competing) to expanding (exporting) sectors, without any change in the overall level of income inequality. In this case there need not be a direct effect of trade liberalization on the inequality-growth relationship, at least in the short-run. In such a case, trade liberalization is a *signal* of policy reform that reduces (some) distortions, and would be expected to be associated with increased growth rates and, ultimately, lower levels of poverty.

Section 2 provides a brief overview of the theoretical and empirical literature on the impact of inequality on growth, and identifies some implications for the effect on poverty. This review is intended only to establish the context; we do not attempt to test, or discriminate between, alternative theories (nor, it should be stressed, is our empirical analysis intended to identify the determinants of growth). Section 3 presents the results for the cross-section, or long-run, relationship, and finds evidence that inequality does appear to be associated with lower growth whereas openness (a less restrictive trade policy) tends to be associated with higher growth. Section 4 extends this analysis to panel estimates and explores the short-run aspects of the relationships. Although there is no evidence for a consistent short-run effect of inequality on growth, liberalizing trade policy does appear to lead to higher growth. Section 5 presents the results for the relationship between growth, inequality, trade liberalization and poverty. Section 6 concludes by observing that neither growth nor inequality appear to be important in explaining differences in poverty in our sample. High levels of human capital and sustained openness do appear to be associated with lower levels of poverty.

2 A brief overview the literature on inequality and growth

Most of the theoretical economics literature posits that inequality has a negative impact on growth. There are four general categories of model that explain how an unequal initial distribution of assets and income can affect growth. For convenience these can be termed political economy, social conflict, credit market and X-inefficiency models.

The standard **political economy** explanations of the effect of inequality on growth are premised on median voter models (Persson and Tabellini, 1994; Bertola, 1993; Partridge, 1997). The greater the inequality shown by the distance between the mean per capita national income and the median income of the eligible voters, the lower will be growth. The logic is that political decisions to redistribute income are more likely to be made when

inequality is greater, and will result in economic policies that tax investment and growth-promoting activities (Persson and Tabellini, 1994). Alesina and Rodrik (1994) develop a dynamic endogenous growth model in which the key feature is that individuals differ in their relative endowment of the accumulated factor (capital) and the non-accumulated factor (labour). Production is a function of capital, labour and production services offered by governments financed by a capital tax (that captures the redistributive policies of government). Growth is a result of investment in capital, which in turn depends on the after-tax return to capital and therefore investment and growth are lower the higher the tax rate on capital.

These models assume both implicit, if not actual, democracy and that redistribution is implemented in a way that reduces growth. The redistribution could have an immediate effect of reducing poverty, but the slower growth suggests this would not be sustained. While these models may have some validity for relatively advanced economies, they hardly seem an appropriate way to represent the majority of developing countries over the past three decades. The underlying mechanism is that in order to maintain support the political elite redistributes income and in doing so reduces the return on capital. There is little evidence for this in developing countries. The successful East Asian economies implemented redistribution via land reform, public spending or real wages, rather than by discouraging investment (Morrissey and Nelson, 1998). Few African or Latin American countries have redistributed income; the productivity of capital may be low, but this is not because of redistribution.

The **social conflict** models can also be viewed as political economy in nature, and perhaps more applicable to the majority of developing countries. The underlying premise is that an unequal distribution of resources is a source of political tension and social conflict. One might expect that poverty would be relatively high in unstable environments, or at least would not be falling significantly. In such a socio-political environment, property rights are insecure and this discourages accumulation. The higher is the gap between the rich and the poor, the greater is the temptation to engage in rent seeking and this in turn reduces investment (Benabou, 1996). Alesina and Perotti (1996) argue that greater inequality leads to less political stability and consequently sub-optimal investment levels.[1] This channel finds support from Rodrik (1998) who argues that greater inequality increases the share of resources dedicated to bargaining over distribution of rent thereby slowing the political system's effective response to external shocks.

Banerjee and Duflo (2001) propose a model that combines political economy and social conflict insights. Groups in a society bargain over whether 'growth-promoting' policies will be implemented. In order to 'buy-off' the poorer group, the rich have to offer some redistribution. If insufficient redistribution is offered, the poorer group withholds support and the beneficial policies are not implemented. While consistent with some of the stylised facts, this approach has limited applicability to developing countries. First, in developing countries one rarely observes an attempt, even implicit, of an elite to offer transfers to the

[1] A number of recent studies provide evidence for the latter effect in SSA. Gyimah-Brempong and Traynor (1999) find that political instability has a direct negative effect on growth and also an indirect effect via discouraging accumulation. Guillaumont et al. (1999) find that SSA has higher levels of primary instabilities (political, climatic and terms of trade) than other developing country regions, and this reduces growth by distorting economic policy so that the rate of investment is volatile, thus the growth rate is lowered.

poor (hence poverty is not falling over time).[2] Second, the elite often resists change not because of bargaining but because it threatens their control over resources and rents. The problem in many developing countries is that no bargaining occurs. Thus, while Banerjee and Duflo (2001) are concerned to explain how (breakdowns) in bargaining give rise to changes in inequality (redistribution) that reduce growth, the fact of developing countries is that inequality is persistent.

The **credit market** channel proposed by Chatterjee (1991) and Tsiddon (1992) is underpinned by the fact that investments are lumpy and access to credit depends on the existence of collateral. Consequently, there is a credit constraint stemming from unequal initial distribution of assets, and this hinders growth. In this context, inequality of land holdings represents a constraint on growth in the agriculture sector, typically the major productive sector in poor developing countries. This is consistent with arguments that stress the importance of land reform to provide a platform for growth. A related argument is that greater income equality encourages human capital accumulation, as there are fewer liquidity constraints and investment in human capital is lumpy (Chiu, 1998). The poor would tend to face the most severe credit constraints and these models offer one explanation for why it is so difficult for the poor to lift themselves out of poverty. Targeted policy interventions are required to reduce poverty.

A fourth approach is based on the argument that high inequality reduces the **X-efficiency** of workers. X-efficiency refers to a measure of workers' productivity holding constant all other inputs into the production process including workers' skills (Leibenstein, 1966, cited in Birdsall et al., 1995). Workers' productivity is limited by a 'virtual' glass ceiling as they do not visualise themselves progressing beyond a certain point and this discourages effort and perpetuates a vicious cycle of low incomes and therefore high inequality. Thus, inequality has a disincentive effect that retards growth. This model relates to incentives and labour productivity (and is not obviously linked to poverty), rather than investment and accumulation (that underpin the other models). As such, this can be viewed as a direct effect of inequality on growth that should be apparent even over the relatively short run. The accumulation-based models, on the contrary, are long-run in nature and relate inequality to growth in an indirect way.

2.1 Empirical evidence on inequality and growth

The classic empirical hypothesis on the relationship between inequality and growth is the well known Kuznets (1955) 'inverted U relationship' between per capita income increases and income inequality. There are three types of argument for why the relationship takes this form. First, Birdsall et al. (1995) argue that as labour shifts from the sector with low productivity (agriculture) to the sector of high productivity (industry), aggregate inequality must initially increase. Second, and in a similar vein, the Lewis dual economy model predicts rising profits in the modern sector while the traditional sector remains stagnant, generating between-sector inequalities. The third explanation looks to an initial unequal distribution of assets as contributing to inequality; those endowed with assets accumulate more compared with those only endowed with labour, but in the process of development this is offset by rising labour incomes. The empirical literature is somewhat inconclusive;

[2] This may be one reason why donors now place a 'pro-poor orientation' so high on the agenda for aid and debt relief. Arguably, such external funding of expenditures targeted on the poor obviates, or at least postpones, the need for redistributing domestic resources.

Deininger and Squire (1996, 1998) argue that the hypothesis is rejected with the use of proper econometric methods and a clean database. However, in a recent sophisticated analysis Banerjee and Duflo (2001) do find that the relationship between inequality and growth is non-linear for many countries.

Table 1
Overview of some studies on inequality and growth

Study	Period	Sample	Estimation	Results (on inequality)
Persson and Tabellini (1994)	1830-1985	Developed, some LDCs 'low' quality	Pooled OLS	negative effect of income share richest 20%
Alesina and Rodrik (1994)	1960-85	70 countries 'low' quality	OLS and 2SLS	negative effect of income and land Ginis
Birdsall, Ross & Sabot (1995)	1960-85	74 countries 'low' quality	Pooled OLS	negative effect (ratio of income share richest 20% to bottom 40%)
Deininger & Squire (1998)	1960-92	27 developing* 'high' quality	Pooled OLS	negative effect of land Gini but income Gini not significant
Forbes (2000)	1965-95	30 (mostly developed) 'high' quality	Panel data (four methods)	negative long-run effect but positive short-run effect of income Gini
Banerjee and Duflo (2000)	1965-95	45 or 50 countries	Panel and non-linear	no robust effect of inequality on growth; *changes* in inequality reduce growth

Source: Summary of indicated studies compiled by the authors.

Notes: Most studies report results with various samples, often using different econometric techniques; the principal results are included here. 2SLS is two stage least squares. * this study also includes results for samples with developed countries.

The 1990s has seen a growing interest in research on whether inequality retards growth. The results of a number of studies are summarized in Table 1. Most empirical work has relied on the Gini coefficient or income share as measures of inequality. Birdsall et al. (1995) find weak evidence for a negative effect of inequality on economic growth (but the finding is not significant on inclusion of a Latin America dummy variable). They also find that land inequality is a greater (negative) influence on growth than income inequality, a result similar to Alesina and Rodrik (1994). Birdsall and Londono (1997) find that although initial land inequality is a significant determinant of growth, it appears not to be robust to the inclusion of dummies for Latin America (Knowles, 2001, offers an explanation for this). Initial education inequality appears to have the greatest influence on growth among all the variables capturing initial inequality. Deininger and Squire (1998) find a negative link between initial inequality and subsequent growth, although this result is only robust for land inequality. This negative relationship is supported by other studies. Of the seven studies in Table 1, five found a negative relationship between income

inequality and growth in the long-run, while for two the effect was insignificant or not robust. Benabou (1996: Table 2) summarizes a range of studies and shows that the balance of evidence is for a negative and significant relationship.

The differences in the results from studies of the inequality-growth relationship can be largely attributed to four factors (all identified in Table 1)—differences in data quality, time period, sample coverage and estimation methods. Data quality is a general problem in growth regressions including developing countries, but is especially acute for inequality data. The Deininger and Squire (1996)[3] database is widely accepted as one of the most reliable sources of data on inequality (and is included in the WIID data source we draw on). Knowles (2001) provides a critical discussion of this data, demonstrating that the use of income as against expenditure based measures biases the results. Deininger and Squire (1998) use this 'high quality' data and find a negative (albeit non-robust) link between initial income inequality and subsequent growth. This negative relationship is supported by other studies including Persson and Tabellini (1994) and Alesina and Rodrik (1994) although they do not use the high quality dataset.

With regard to the time period, almost all studies before 1996 are based on long period averages for a cross-section of countries, and thus capture any 'long-run' relationship. Later studies use the Deininger and Squire (1996) data that provides observations for a large number of countries for a number of years during 1960-92. Forbes (2000), for example, uses sub-period panels to examine the 'short-run' relationship. She finds a positive, significant and robust relationship between inequality and growth in the medium and short run, that is, higher inequality is associated with higher growth. This is in contrast to the evidence for a negative relationship in the long-run.

Another factor explaining the divergence in results is the sample coverage. Forbes (2000), for example, includes no sub-Saharan African country and half of the sample comprises OECD countries (most others are relatively rich developing countries). About half of the countries in the samples used by Deininger and Squire (1998), Barro (1999), Banerjee and Duflo (2001) are developing. The evidence suggests that the relationship is different for OECD as compared with developing countries. Deininger and Squire (1998) also find a negative, significant and robust effect of initial land inequality on growth, a result that holds true for all countries in their sample and also for a sample of developing countries.

Another reason for differences in results could be the estimation methods. Cross-section estimation methods have many weaknesses, documented by, among others, Levine and Renelt (1992). The use of panel estimation methods to control for country and time specific effects has been precluded by the paucity of good quality data. Forbes (2000) stands out in this regard. Furthermore, the inability of cross-country work to address the effect of a change in a country's inequality level on within-country growth provides justification for use of panel data methods (Forbes, 2000).

What emerges from the foregoing discussion is that there is likely to be a negative relationship between inequality and growth in the long-run, although this may not be the case in the short-run. In general one would expect poverty to be higher in countries with

[3] This paper provides a discussion of the criteria for selecting and cleaning the data and a critical discussion of the data used in earlier studies.

higher levels of inequality. Research on the inequality-growth relationship has tended not to include SSA countries in the sample, nor has the potential role of trade and trade policy been explored. As trade liberalization is an indicator of economic policy shifting to a market-oriented regime with greater incentives, it should have a positive impact on growth. The empirical analysis of the next section thus extends the literature in these two directions—focussing on developing countries and including trade variables.

3. Cross-section (long-run) results

For the basic 'long-run' regression we use cross-section data for 44 developing countries over 1970-95 (details on data sources are provided in the Appendix). The growth literature points to the importance of initial values in explaining subsequent growth. We estimate a standard version of the cross-country growth regressions now prevalent in the literature. The base specification is a modification of Lensink and Morrissey (2000), including initial inequality (*GINI*), the value of the Gini index for the year closest to 1970) but excluding aid. The basic variables in the growth regressions are the investment/GDP ratio (*INV*, average over the period), initial income per capita in 1970 (*GDP0*) and initial human capital as proxied by the secondary-school enrolment rate in 1970 (*HC0*).[4] The basic equation estimated, where the dependent variable is per capita GDP growth over the period (g), is:

$$g = \beta_0 + \beta_1 GINI + \beta_2 GDP0 + \beta_3 HC0 + \beta_4 INV + \mu \qquad (1)$$

GDP0 and *HC0* are included because they have been shown to have a robust and significant impact on economic growth (Lensink and Morrissey, 2000). *GDP0* captures convergence and its expected sign is negative. The coefficient on *GINI* is expected to be negative. The coefficients on *HC0* and *INV*, representing human and physical capital respectively, and are expected to have positive signs.

This specification is similar to that used in most empirical work in this area (Perotti, 1996, Forbes, 2000), although precise measures of the variables differ from study to study. The variables included are widely accepted as core explanatory variables. The reasons for not including additional variables are similar to those advanced by Forbes (2000) and Perroti (1996), namely; the need to maximise degrees of freedom given the limited availability of inequality data and to facilitate comparability between studies. The results should be interpreted cautiously given the limited sample size and the exclusion of variables that others have found to be significant determinants of growth.

Table 2 presents the results from estimating the basic equation. Investment is the principal 'driver' of growth, an expected result although our human capital variable is not significant. While growth may itself be a determinant of investment, implying potential endogeneity, our use of the average investment/GDP ratio implies that this should not be a serious problem for overall period growth rates. Endogeneity of inequality is not a problem as we are using the initial value of the Gini but period growth. Similarly, as the dependent variable is long-term growth it is unlikely that endogeneity of other explanatory variables

[4] We tried alternative human capital measures, such as average years of schooling, but the results were unaffected.

is a problem. The coefficient on *GINI* is found to be negative, i.e. higher inequality results in lower growth. This result is quite robust in the three specifications reported. We also find that the dummy for SSA countries (*SSA*) has a negative coefficient, although only weakly significant. The significance of the coefficient on *GINI* is reduced by the inclusion of *SSA*, suggesting that in the sample SSA countries may have relatively higher initial inequality, but there appears to be a negative SSA effect on growth that is independent of inequality.[5] The coefficient on initial GDP is weakly significant only when *SSA* is included and *HC0* excluded, suggesting collinearity between these three variables.

Table 2
Cross-section regressions for GDP per capita growth

	(2.1)	(2.2)	(2.3)
GINI	-0.055***	-0.043**	-0.044**
	(-2.72)	(-2.11)	(-2.17)
GDP0	-0.0004	-0.0003	-0.0004*
	(-1.62)	(-1.30)	(-1.94)
HC0	0.010	-0.013	
	(0.51)	(-0.60)	
INV	0.323***	0.315***	0.312***
	(7.62)	(7.63)	(7.67)
SSA		-1.268*	-1.025*
		(-1.80)	(-1.79)
R–squared (adj)	0.652	0.680	0.677
Observations	44	44	44

Source: Authors' estimates.

Notes: Figures in parentheses are t-ratios: ***denotes significant at 1 percent level, **significant at 5 percent and *significant at 10 percent. The F-test supports the hypothesis that all coefficients are jointly significant (i.e. rejects the null that all are zero). *HC0* is not significant even if initial GDP omitted. Diagnostic tests reveal no evidence of serial correlation or heteroscedasticity. The normality assumption of the error term is not violated and tests support the functional form used.

It is well known that collinearity causes the sampling variances, standard errors and covariances of the least squares estimator to be large, implying high sampling variability and wide interval estimates and consequently reduced precision of the estimates. The literature points to possible correlation between physical capital investment (*INV*) and investment in human capital (*HC0*) as well as correlation between income inequality and secondary school enrolment. This is not strongly supported by our dataset, with correlation coefficients of 0.24 and -0.048 respectively. As the coefficient on *HC0* is not significant, this is the variable we choose to drop (regression 1.3). In doing this we follow other studies, such as Clarke (1995), Deininger and Squire (1996). This implies that the

[5] There is a general tendency for sub-Saharan Africa (SSA) countries to perform relatively badly (e.g. an 'SSA' dummy is negative and significant) in cross-country growth regressions. 'Africa's slow growth is thus partly explicable in terms of particular variables that are globally important for the growth process but are low in Africa' (Collier and Gunning, 1999: 65). This begs the question why these variables are especially low in Africa, an issue not pursued here.

coefficient on *GINI* includes any indirect effect of income inequality on growth through its effect on education (Knowles, 2001).

Knowles (2001) notes that if the Gini is measured on an expenditure rather than an income basis, its significance tends to decline and he argues that empirical researchers should use a consistent definition of the Gini. Unfortunately, this would leave us with very small samples of countries with Gini measured on the same basis. Following Deininger and Squire (1998) and Forbes (2000) we adjusted the expenditure based Gini to an income based measure using the Deininger and Squire (1996) adjustment. The estimated coefficients on *INV* and *GINI* are similar to those in regression (2.3).[6] However, the significance of the Gini is reduced, as posited by Knowles (2001), and both initial GDP and the SSA dummy become insignificant. This reaffirms the collinearity and data quality problems in growth regressions for developing countries. Nevertheless, the estimated sign and coefficient on the inequality variable appears robust to alternative specifications.

We now introduce indicators of the orientation of the trade regime into specification (1). There is a large literature on the relationship between trade policy and growth, and the difficulties of measuring trade stance are well known (see Edwards, 1993, 1998; Greenaway *et al*, 1998; Milner and Morrissey, 1999; Rodrik, 1992, 1998, 1999). Given the problems of measuring openness we use two of the more widely accepted measures. The Black Market Premium (*BMP*, defined as (black market rate/official rate)-1) is a good indicator of the overall level of distortion in the economy as it captures the deviation of the exchange rate from its market level. The second indicator is the proportion of years between 1965 and 1990 that an economy could be considered open, the Sachs-Warner index (*OPEN*). Both measures are drawn from Sachs and Warner (1997). It should be noted that few of the African economies liberalized much before 1990. The choice of the indicators is driven by their demonstrated robustness in empirical studies (Harrison, 1996; Edwards, 1998).[7] Again, we emphasize that we are seeking to identify correlations and the results should not be interpreted as implying a causal relationship.

The results from cross-section estimation are in Table 3, representing the addition of trade openness variables to the regressions in Table 2. Column (3.1) shows that when *BMP* is included it has a negative and significant coefficient whereas the coefficient on *GINI* becomes insignificant. This may indicate possible collinearity between *GINI* and *BMP* although the correlation between the two is relatively low (0.295). A plausible interpretation is that *BMP* and *GINI* do not always proxy for the same distortions, but they do in general. In other words, the results suggest that it is not inequality *per se* that retards growth but inequality may encourage the types of distortions that retard growth, and these are often captured by the *BMP*.

The results from regressions (3.2) and (3.3) show that when *OPEN* is added to the basic model including *GINI* the coefficient on *OPEN* is insignificant, although the SSA dummy

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[6] As this adjustment is rather *ad hoc* we do not report the results (they are available on request).

[7] Dollar and Kraay (2001) in a study with a similar focus to ours, use a trade volume measure to capture trade policy. The disadvantage with their approach is that one must infer policy from observed volume changes (that may be attributable to non-policy factors in an unsystematic way). As our concern is to capture the *signal* of trade policy change, the openness measure used here (and the timing of liberalization measure used in the next section) is appropriate, if imperfect.

also becomes insignificant. This suggests that controlling for inequality, openness does not add any explanatory power; SSA countries tend to have low values of *OPEN* but high values of *GINI*. When *OPEN* is included on its own, the coefficient is positive and significant, while the SSA dummy is negative and significant. Note that the correlation between *GINI* and *OPEN* is very low (-0.07). Thus, the results in (3.3) suggest that openness is conducive to growth; the negative SSA dummy captures the fact that SSA countries only liberalized their trade regime from the late 1980s or early 1990s, towards the end of our sample, hence the value of *OPEN* will be low for them.

Table 3
Cross-section estimates with openness indicators

	(3.1)	(3.2)	(3.3)
GDP0	-0.0005	-0.0004	-0.0004
	(-2.32)**	(-2.04)**	(-1.93)*
INV	0.307	0.319	0.262
	(7.85)***	(7.79)***	(5.79)***
SSA	-1.070	-0.923	-1.132
	(-1.95)*	(-1.60)	(-2.07)**
BMP	-0.850		
	(-2.13)**		
OPEN		-0.002	2.001
		(-1.15)	(2.54)**
GINI	-0.033	-0.049	
	(-1.641)	(-2.351)**	
R-squared (adj)	0.711	0.688	0.694
N	44	44	44

Source: Authors' estimates.

Notes: As for Table 2. The F-test supports the hypothesis that all coefficients are jointly significant and diagnostic tests support the specification.

The results in Table 4, regressions (4.1) and (4.2), confirm our earlier suggestion that *BMP* and *GINI* are capturing essentially similar effects (in the long-run), even if the correlation between them is relatively low. It is plausible to argue that *BMP* represents general inefficiencies in the economy that may arise due to inequality (for example, increased corruption or rent seeking). Either included alone has a negative and significant coefficient, while the interaction term (*GINIBMP*) also has a negative and significant coefficient, but its inclusion renders either of the other terms insignificant. We can note the SSA dummy is only (weakly) significant (and negative) in permutation (4.1), suggesting that the negative SSA effect is not fully explained by inequality (although it is captured by *BMP*).

Regressions (4.3), (4.4) and (4.5) show that the growth-inequality-openness relationship is somewhat more complicated. Previous results showed that inequality alone has a negative effect on growth, openness alone has a positive effect but when both are included together the negative inequality effect dominates. The inclusion of the interaction terms allows us to elaborate, noting that its inclusion adds nothing to the regression with *GINI* only (4.3). However, in (4.4) we find a negative and significant coefficient on *OPEN*, but this is offset

Table 4
Cross-section regressions with interaction terms

	(4.1)	(4.2)	(4.3)	(4.4)	(4.5)
GDP0	-0.0005	-0.0004	-0.0004	-0.0004	-0.0004
	(-2.35)**	(-2.23)**	(-2.01)*	(-1.82)*	(-2.14)**
INV	0.308	0.316	0.320	0.275	0.274
	(8.02)***	(8.28)***	(7.70)***	(5.98)***	(6.50)***
SSA	-0.986	-0.729	-0.952	-1.204	-0.616
	(-1.82)*	(-1.27)	(-1.64)	(-2.15)**	(-1.11)
GINI	-0.024		-0.048		-0.056
	(-1.15)		(-2.29)**		(-2.85)***
BMP		2.882			
		(1.68)			
OPEN				-0.037	-0.044
				(-2.05)**	(-2.65)**
GINIBMP	-0.017	-0.070			
	(-2.40)**	(-2.33)**			
GINIOP			-0.001	0.035	0.042
			(-0.94)	(1.99)*	(2.55)**
R^2 (adj)	0.719	0.729	0.684	0.676	0.734
N	44	44	44	44	44

Source: Authors' estimates.

Notes: As for Table 2. The F-test supports the hypothesis that all coefficients are jointly significant and diagnostic tests support the specification. (4.2) was estimated including *GINI* but the coefficient was insignificant and that on *GINIBMP* became insignificant; other coefficients were largely unaffected. (4.5) was estimated without *SSA* but the coefficients were largely unaltered.

by the positive and significant coefficient on the interaction term (regression (4.5) is consistent with this). Note that the negative SSA effect persists unless *GINI* is also included. The implication appears to be that initial inequality helps to explain poor growth, and openness itself does not add to this explanation. This partly reflects limitations in the openness measure. The effect of openness on growth seems to depend on the level of inequality. Surprisingly, perhaps, openness appears to have a positive effect on growth only when inequality is high, except for SSA countries (the dummy term is negative and significant). An interpretation is that for the non-African countries in the sample, when those with high inequality liberalized the trade regime the effect was to increase growth, perhaps because liberalization under high inequality had a greater impact on relative incentives, i.e. a more dramatic effect on economic performance.

As *GINI* is an initial value, growth is an outcome over the whole period and trade liberalization is an event at some point during the period, the specification estimated here may be misleading. The *OPEN* variable is the proportion of the time a country was liberalized, and will be higher the earlier the country liberalized (and very low for most SSA countries). Political economy models would predict that high inequality is associated with distortions to the economy, and should discourage liberalization. These models do not, however, predict what would happen when liberalization occurs. On the one hand, one may expect that high inequality implies that the benefits of liberalization will be unevenly

distributed. On the other hand, liberalization itself may be a sign that inequality (or at least the distortions induced by inequality) is being reduced. The above results lean in favour of the latter interpretation: openness has a positive growth impact in countries with high inequality, perhaps because it does not impact so much on distribution or incentives in societies with moderate inequality. It is therefore important to try and locate the timing of openness, hence the need for the panel approach undertaken in the next section.

4 Panel data (short run) estimates

This section employs panel estimation methods to investigate whether there is a difference in the long and short run effects of inequality on growth, and the relationship of this to trade liberalization. A panel is constructed of five 5-year time periods running from 1970-4 to 1990-4. A sub-set of the countries in the cross-section analysis is used (determined by data availability). The indicator of the timing of trade liberalization used is the Sachs and Warner (*SW*) index, a dummy variable taking a value of 1 for each year beginning from the year when liberalization is said to have occurred and 0 before this.[8] We also augment the Sachs-Warner index (*SWaug*) to add another five countries using our judgement of when they liberalized (see Appendix). Investment is Gross Domestic Investment as a percentage of GDP averaged over the five year period (*GDIP*). The *GINI* is income inequality at the start of the five-year period, or as near to then as available (from WIID). A period dummy (*PDum*) is used for 1980-94, during which most of the sample liberalized their trade regime. Starting income is measured as the log of initial GDP (*GDP0*) in each period.

Results are reported in Table 5. The coefficient on *GINI* is insignificant, in contrast to Forbes (2000) who finds these to be positive and significant. The difference in the results can be attributed to several factors, notably differences in samples, data and estimation technique—Forbes (2000) used GMM estimators but our data are inadequate to avail of that particular technique. As previously, investment is a major determinant of growth, and there is evidence for convergence within the sample. We find evidence that trade liberalization, as proxied by the SW (or our augmented SW) index, is associated with higher growth. Note that the period dummy has a negative coefficient (only significant if openness indicators included), implying that liberalization offset some other negative effect on growth. However, this equation may be mis-specified as *GDIP* is likely to be endogenous, i.e. growth is a determinant of average investment rates during each period. Endogeneity of inequality does not appear to be a problem—the values of the Gini for each country change little over time, and growth does not appear to be a determinant of the change in inequality (results available on request). To address the problem of endogeneity of investment, we re-estimated the equation without investment, but including initial education level (*SEC*, initial values of secondary school enrolment rates for each period) as a proxy for initial capital.[9] In Table 6 the results suggest that trade liberalization does promote growth, whereas inequality independently appears to have no short run effect on growth. There is weak evidence of convergence, and that countries with higher levels of human capital tend to exhibit higher rates of growth. There is also evidence that growth

[8] We are grateful to Peter Wright for providing the data. We also tried the World Bank and Dean indicators used in Greenaway, Morgan and Wright (1998), but the coefficient was insignificant in almost all specifications.

[9] We also tried alternative measures of human capital, but the coefficients were never significant.

performance was generally poor in the 1980-94 period, due to factors not specified in our model.

Table 5
Panel regressions with Sachs-Warner indices

	(5.1)	(5.2)	(5.3)	(5.4)
GINI	0.0004	-0.0003	0.0006	0.0006
	(0.96)	(-1.02)	(1.29)	(1.58)
GDIP	0.002***	0.002***	0.002***	0.002***
	(2.62)	(4.03)	(3.44)	(4.31)
GDP0	-0.019**	-0.008***	-0.022**	-0.024***
	(-2.01)	(-3.00)	(-2.53)	(-2.81)
SW		0.023***		
		(-3.79)		
SWaug				0.020***
				(3.409)
PDum	-0.008	-0.018***	-0.007	-0.014***
	(-1.66)	(-3.79)	(-1.58)	(-3.06)
R^2 (adj)	0.375	0.293	0.402	0.459
N	129	129	145	145

Source: Authors' estimates.

Notes: As for Table 2. The Lagrange Multiplier test did not reject the null hypothesis that pooled least squares (POLS) is appropriate against an alternative of fixed or random effects in (5.2) Where appropriate, the Hausman test was used to choose between Random Effects and Fixed Effects models. Tests supported the efficiency of fixed effects models for (5.1), (5.3) and (5.4). Further results available on request.

Table 6
Panel regressions excluding investment

	6.1	6.2	6.3
GINI	-0.0001	-0.0001	0.0003
	(-0.33)	(-0.38)	(0.64)
SEC	0.0005***	0.0004**	
	(2.82)	(2.42)	
GDP0	-0.007*	-0.007**	-0.013
	(-1.92)	(-2.42)	(-1.55)
PDum	-0.023***	-0.029***	-0.016***
	(-4.74)	(-5.68)	(-3.32)
SW		0.022***	0.014**
		(4.107)	(2.345)
R^2 (adj)	0.1676	0.2391	0.3704
N	132	132	148

Source: Authors' estimates.

Notes: As for Table 5. Tests supported the efficiency of POLS for (6.2) , whereas random effects estimates are reported in (6.1) and fixed effects in 6.3. Further results available on request.

This may resolve part of the dilemma we found at the end of the previous section. In the long-run cross-section analysis, inequality could have been related to the timing of liberalization hence interacted with *OPEN*. In other words, liberalization could have been later, hence a lower value of *OPEN*, in countries that initially had higher levels of inequality. We address this in the panel, and find that trade liberalization itself is associated with increased growth rates, whereas inequality is not significant in the short-run. A plausible interpretation is that trade liberalization removes some of the distortions that constrain growth, hence growth tends to improve.

Table 7
Cross-section influences on level of poverty

	POV1	*POV1*	*POV1*	*POV2*	*POV2*	*POV2*
g	4.48	-79.30	-68.35	-117.84	-114.1	-0.003
	(0.05)	(-1.16)	(-1.04)	(-1.05)	(-0.92)	(-1.36)
SEC0	-0.61***	-0.79***	-0.69***	-0.45*	-0.71***	-0.73***
	(-3.24)	(-7.22)	(-6.20)	(-1.97)	(-3.32)	(-5.75)
NRE	0.13	-1.06**	-0.95**	-0.11	-0.38	0.013
	(0.22)	(-2.88)	(-2.75)	(-0.15)	(-0.50)	(0.15)
GINI	-0.81*	-0.16	-0.40*	-0.92*	-0.33	-0.15
	(-2.04)	(-0.66)	(-2.01)	(-1.84)	(-0.57)	(-0.80)
SWaug	-2.16	4.97	4.57	5.83	3.09	
	(-0.29)	(0.67)	(0.63)	(0.543)	(0.27)	
OPEN						-15.86***
						(-3.33)
SSA	39.41**		13.88***	29.35***		
	(2.49)		(3.46)	(4.85)		
R^2 (adj)	0.38	0.31	0.28	0.50	0.18	0.61
N	20	19	19	19	19	32
F (prob)	0.05	0.08	0.12	0.02	0.18	0.000
	(with outlier)	(no outlier)	(no outlier)	(no outlier)	(no outlier)	

Source: Authors' estimates.

Notes: Significance levels as for Table 2. The criterion of values of at least 2 standard deviations from the mean was used to identify outliers on specific variables (see discussion in Dalgaard and Hansen, 2001). Zambia (*POV1*) is thus omitted from columns 2 and 3. *POV2* regressions were also estimated including the outlier (Jamaica) but the results were weaker. Botswana *NRE*), Guyana (*NRE*), Korea (*SEC0*) and Zambia (*POV2*) were also outliers, but omitted anayway due to missing observations. The specification was estimated with growth over 1970-85 rather than previous period growth (*g*); the coefficient was significant only when *SSA* excluded, otherwise results were similar.

5. Provisional results on growth, trade and poverty

Ideally, we would like to extend the analysis of the previous sections to address effects on poverty. Unfortunately, adequate data on poverty are not available for all of the countries included here and the data that are available only provide observations after 1985 (World Bank, 2001; Hanmer and Naschold, 2001). We were able to obtain two observations on the poverty headcount (percentage of the population below the international $1PPP per day

poverty line) for 32 of the countries used in the earlier analysis. We here present some exploratory analysis using this data.

We constructed the following dataset. For each of 32 countries there are two observations of poverty, *POV1* (1985-90) and *POV2* (after 1990). The explanatory variables used are all lagged (i.e. they refer to the previous five-year period) and growth (*g*) is the first difference of the log of GDP per capita between the start and end of the preceding period. Unfortunately, data on the 'lagged values' for all explanatory variables were only available for 22 of the countries, hence restricting our sample. The explanatory variables are as previously defined, except for the addition of natural resource endowment (*NRE*), measured as land area per worker. This variable is used to capture the tendencies for poverty to be higher in rural areas (the agricultural sector should be a larger share of the economy in relatively land abundant economies) and for countries dependent on primary commodity exports to exhibit slower growth (hence poverty will be higher).

The results are presented in Table 7. Considering the results without the outliers, there is fairly strong evidence that poverty is lower in countries with higher levels of human capital (measured as secondary school enrolment in previous period). The SSA dummy is positive and highly significant, implying that there are omitted variables specific to Africa that are associated with high levels of poverty. These are the only variables that are consistently significant. The coefficient on previous period growth (*g*) is not significant. Surprisingly, perhaps, the coefficients on inequality and *NRE* are negative when significant. The coefficient on *GINI* is only significant when *SSA* included. Controlling for human capital and whether the country is in SSA, poverty appears to be lower in countries where inequality or land abundance are relatively high. As argued in the previous sections, the other explanatory variables are themselves determinants of growth. Thus, the coefficient on the other variables can be interpreted as their effect independent of any effect via growth (that, anyway, appears to be absent).

Trade liberalization is not related to poverty, in the sense that the coefficient on *SWaug* is not significant. However, this may not be a good measure as one would not expect liberalization to have a consistent immediate effect on relative levels of poverty. In the final column of Table 7 we use the same variables used in the cross-section analysis of Section 3 (i.e. initial values in the 1970s for GDP and *GINI* and average value for *SEC*), include initial *NRE* and *OPEN* and present results for *POV2* with a larger sample. The coefficient on *OPEN* is negative and significant (*SSA* is omitted as it is highly correlated with *OPEN*). Countries with a relatively more open trade regime during 1965-90 tended to have relatively lower levels of poverty in the early 1990s. The only other significant variable is secondary enrolment, and again the coefficient is negative.

Implicit in the cross-section approach is the assumption that the coefficient on the explanatory variables is the same for each country. It follows that we can treat each observation of poverty as independent and pool the sample (i.e. we assume the coefficient on the explanatory variables are the same for each country over time in addition to assuming the coefficients are the same for all countries). Thus, to permit a larger sample for the exploratory analysis, we pool the data. The results are in Table 8, where *growth* refers to the difference of log GDP per capita between 1980 and 1984 for *POV1* and between 1985 and 1989 for *POV2*. Again, the coefficient on *growth* is insignificant but countries with higher levels of human capital tend to have lower poverty. Controlling for the other variables, SSA countries have higher levels of poverty. Inequality again appears

to be negatively associated with poverty (significantly so when we omit outliers). Accounting for the tendency of poverty to be higher in SSA and lower in countries with high levels of secondary enrolment, it appears that poverty is lower in countries with high inequality. Openness appears to have no independent effect on poverty.

Table 8
Influences on poverty, pooled sample

	(8.1)	(8.2)
growth	-57.264	-68.139
	(-1.25)	(-1.65)
SEC	-0.525***	-0.474***
	(-3.27)	(-3.74)
GINI	-0.532	-0.754**
	(-1.60)	(-2.52)
OPEN	-4.613	1.231
	(-0.50)	(0.17)
SSA	26.921***	27.229***
	(3.66)	(4.28)
R^2 (adj)	0.519	0.569
N	45	41
F (prob)	0.0000	0.0000
Estimator	POLS	POLS
	with outliers	no outliers

Source: Authors' estimates.

Notes: As for Table 7. Results for tests for choosing between POLS, FEM and REM are available on request. The countries excluded as outliers are Botswana, India, Jamaica and Zambia. The model was estimated with *NRE* but the coefficient was highly insignificant. A version with a smaller sample was estimated with *SWaug*; the coefficient was insignificant and otherwise results were similar.

Our data only relate to poverty levels (there are too few observations to construct a reasonable sample for changes in poverty). As it would take time for growth to affect poverty, and the responsiveness of poverty to growth will differ across countries, it is perhaps not surprising that we fail to find evidence that previous period growth rates help to explain relative levels of poverty. We do find that higher levels of human capital are associated with lower poverty. To the extent that long-run growth is associated with rising levels of secondary school enrolment, this suggests a pro-poor pattern of growth (i.e. growth that reduces the poverty headcount). Similarly, a sustained relatively open trade regime also appears to be part of a pro-poor growth pattern (in Table 7).

There is weak evidence that higher levels of inequality (either initially, in the 1970s, or in the previous period), once we control for whether a country is in SSA, are associated with lower levels of poverty. This supports the observation made earlier that there is no systematic relationship between inequality and poverty (the correlation of -0.14 is quite low). In SSA countries there is a damaging combination of high inequality, low growth, low human capital and restrictive trade policies. In non-SSA countries, we can at least say that inequality is not a source of poverty, whilst education and openness appear to reduce poverty.

6 Conclusions

Inequality retards growth because it is associated with policy distortions. The conventional view, as outlined in Section 2, is that income inequality tends to be associated with (or even a proxy for) inequalities in the distribution of power. High inequality will be associated with distortions in the economy, such as high levels of protection, and incentives for rent-seeking behaviour. These in turn tend to reduce growth. Thus, inequality and restrictive trade policies will tend to be correlated, at least in the long-run, and both associated with lower growth. Trade liberalization is an indicator of economic policy reform in which distortions are reduced and market incentives increased. Consequently, it should be growth-promoting, but may not have any systematic effect on inequality.

This paper uses cross-section and panel econometric techniques to investigate the links between growth, inequality and trade liberalization. A number of general conclusions emerge from our sample of 44 developing countries. First, inequality does tend to retard growth in the long-run (there is no evidence for a short-run effect), whereas trade liberalization tends to be associated with increased growth. There is not a high correlation between initial income inequality and initial GDP per capita, so it is not evident that poorer countries necessarily have higher inequality. Africa does appear to be different—SSA countries have a below average growth performance that cannot be explained fully by the variables we consider, including inequality. The results suggest that it is not inequality *per se* that retards growth but rather that inequality may encourage the types of distortions that reduce economic performance.

In the long-run estimates, openness (measured as the proportion of the period the country was defined as open) is not consistently related to growth. On the basis that the timing of liberalization may be important, we conducted a panel analysis for five 5-year periods over 1970-94. The results suggest that in the short run trade liberalization appears to be associated with increased growth, whilst inequality does not appear to affect growth. These principal results are quite robust to alternative specifications.

We then presented an exploratory analysis of the influence of growth, inequality and trade liberalization on poverty. The only strong patterns in the data are that countries with higher levels of human capital also appear to have relatively lower levels of poverty, whereas poverty levels are higher in SSA. There is no evidence that differences in growth rates are associated with differences in levels of poverty for the countries in our sample. Inequality, controlling for other variables, appears to be negatively associated with poverty. The timing of trade liberalization does not appear to be related to poverty, suggesting that any effects take time, but countries with less restrictive trade policies over a sustained period tend to have lower levels of poverty at the end.

We do not identify the factors explaining differences in levels of poverty across countries, but we do identify some factors that are important. Countries with lower levels of poverty are those that invested in human capital and sustained a relatively open trade regime. In such countries, relatively high levels of inequality are not associated with relatively high levels of poverty (if anything, the reverse is the case). Thus, just as we argued that inequality *per se* may not be a constraint on growth, inequality itself is not a bar on reducing poverty. It is the policy distortions that tend to be associated with high levels of

inequality that retard growth, and it is the patterns of growth, rather than growth itself, that determines the effect on reducing poverty. Our results also caution against concluding that a pattern of growth that reduces inequality *automatically* reduces poverty. Some countries with relatively high levels of inequality nevertheless have relatively low levels of poverty.

The 'negative' sub-Saharan Africa effect identified in the empirical growth literature appears to persist in levels of poverty: not only do SSA countries have lower levels of the variables associated with lower poverty, but even controlling for this poverty is higher in SSA countries. The unobserved (in this study) characteristics of SSA countries that contribute to poor growth performance also appear to contribute to high levels of poverty. It is beyond the scope of this paper to address what these may be (Collier and Gunning, 1999, provide a discussion). If the policy objective is to reduce poverty in SSA, a focus on growth, human capital and removing distortions in trade policy is warranted, and these factors are more important than a focus on inequality itself. However, the disadvantages faced by SSA countries go deeper than these variables, and addressing these factors only will be insufficient to attain poverty-reducing growth.

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Appendix: List of variables and data sources

GDP0 = GDP per capita in 1970

GROWTH = average real per capita growth rate over 1970-95 period

INV = average investment to GDP ratio over 1970-95 period

BMP = Black Market Premium, computed as [(black market rate/official rate)-1]

OPEN = Proportion of the years between 1965 and 1990 that the economy is considered to be open by the criteria set by Sachs and Warner (1997).

GINIBMP = Interaction variable *GINI*BMP*

GINIOP = Interaction Variable *GINI*OPEN*

SEC = secondary school enrolment rate

GINI = Gini coefficient of income inequality

SSA = dummy variable with the value of unity for countries in Sub-Saharan Africa and zero for all others

POV1 = Average Headcount Index (% below $ 1 per day PPP 1993) 1985-89

POV2 = Average Head count Index 1990-94.

Sources: *World Development Indicators 1997* (CD-ROM) Barro–Lee dataset, World Income Inequality Database (WIID) World Bank (2001) and Sachs and Warner (1997).

Descriptive summary statistics

Series	**N**	**Mean**	**Std dev**	**Minimum**	**Maximum**
GDP0	44	1052.7	1100.8	92.2288	5736.6
GINI	44	46.8132	11.4625	27.9	79.5
SEC0	44	25.5682	14.9688	1.000	59.000
INV	44	21.7489	5.5350	10.5600	35.45

Additional countries for augmented Sachs-Warner index

	1970-4	1975-9	1980-4	1985-9	1990-4
Egypt	0	0	0	0	1
Nepal	0	0	0	0	1
Madagascar	0	0	0	1	1
Nigeria	0	0	0	1	0
Turkey	0	0	0	1	1